

**Lesson:** 6-7

**Equipment:** Thermometers, boiling tubes two types of crisp, balance, tongs clamp stands Goggles.

**Safety:**

# AMCAN

## Learning Outcomes

### Challenging:

Name the equipment used in industry to measure the energy content in food.

### More Challenging:

To be able to make a systematic method.

### Most Challenging:

To make a success criteria which allows you to design a fair investigation.

# Starter

Each grilled burger (94g) contains

Energy 924kJ 220 kcal	Fat 13g	Saturates 5.9g	Sugars 0.8g	Salt 0.7g
11%	19%	30%	<1%	12%

of an adult's reference intake

Typical values (as sold) per 100g: Energy 966kJ / 230kcal

How do food companies know how much energy is in food?

# Answer

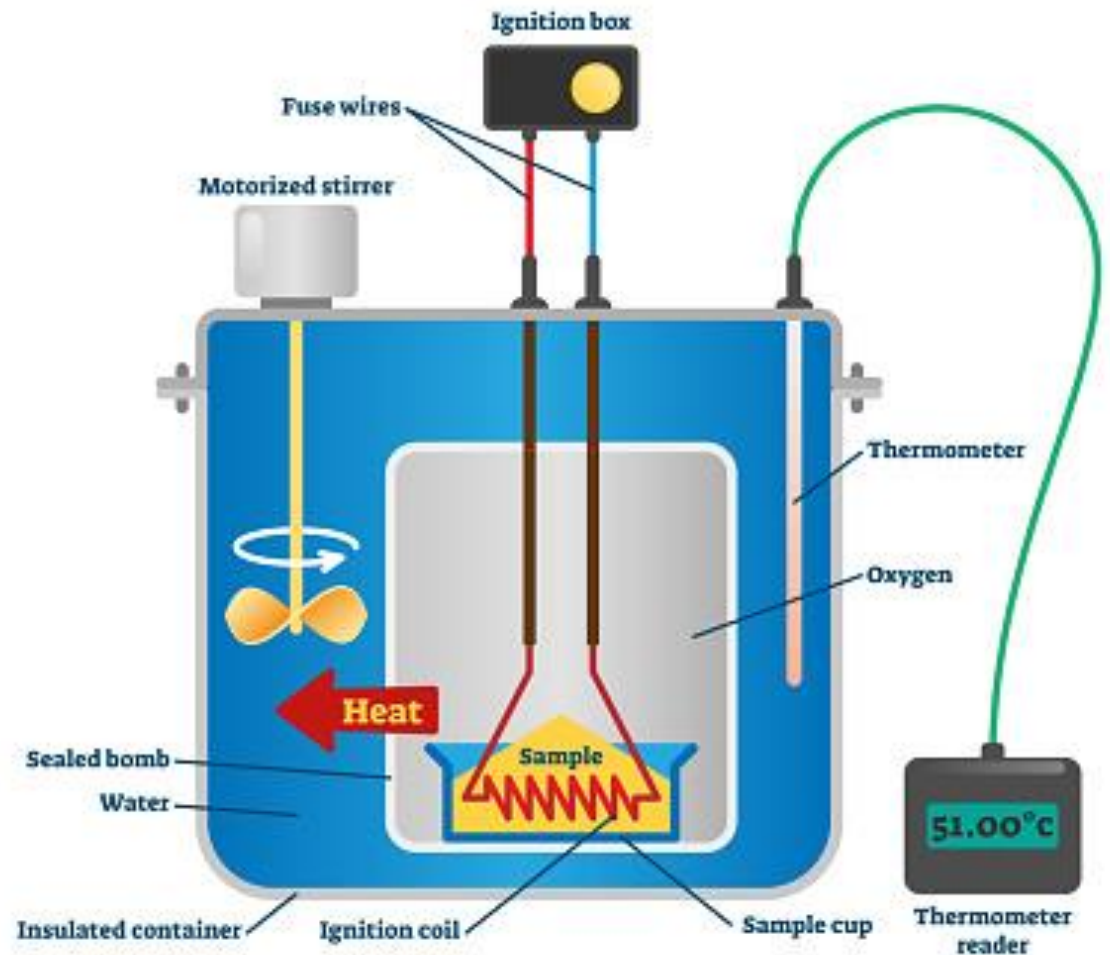
They use a bomb calorimeter.

How do they work?



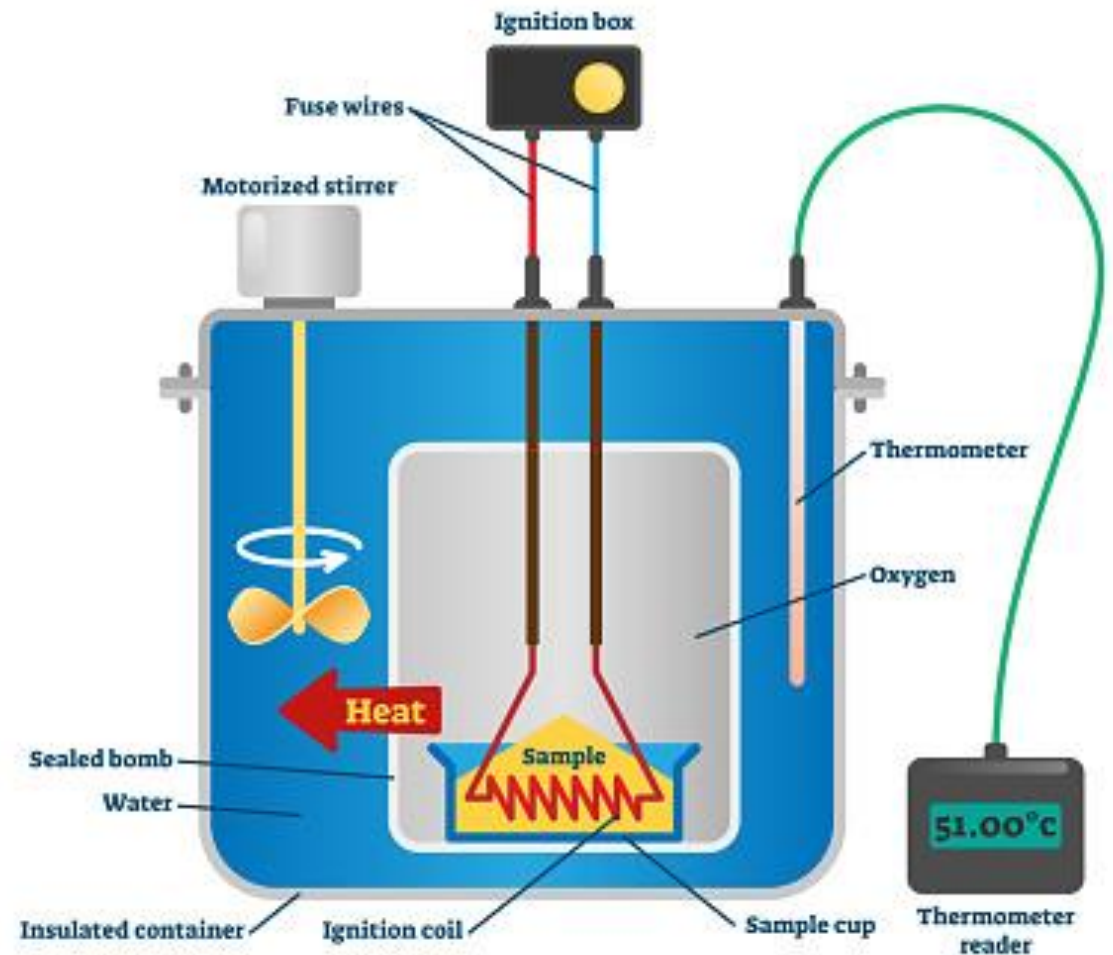
- The sample is the food.
- Inside the sealed bomb chamber is pure oxygen.
- The ignition box sets the food on fire.
- It burns and then the heat energy moves into the water.
- The thermometer then measures the temperature change.

## BOMB CALORIMETER



If we know the **mass** of the food burned and the **temperature rise** of the water we can use a simple equations to work out the energy in that sample of food.

## BOMB CALORIMETER





# Investigate

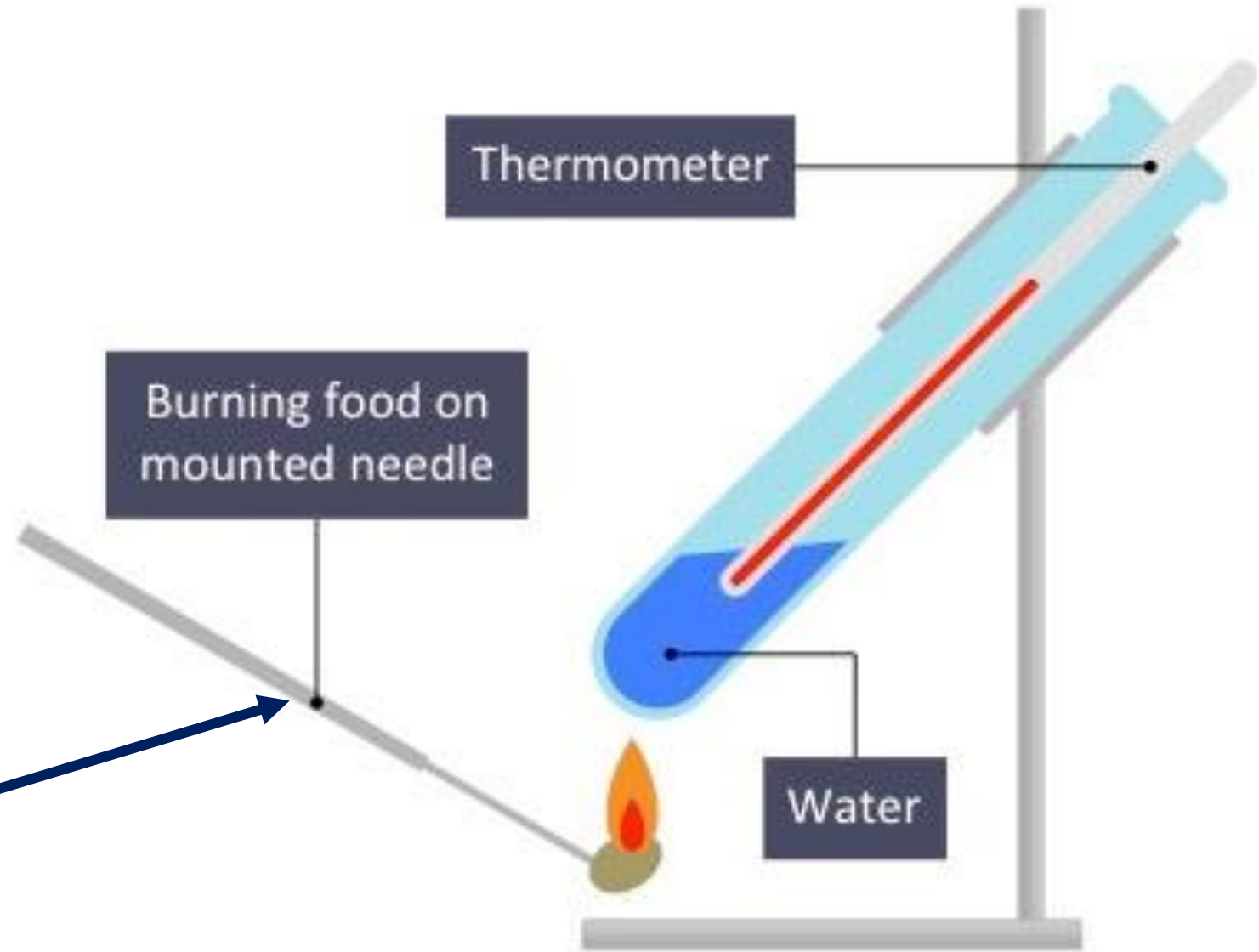
Using lab equipment you can do a similar experiment.

- Remember we need to burn food
- Then warm up water
- Then measure the temperature rise.

Draw a diagram of the apparatus we could use then explain your idea.

Using these apparatus we are going to investigate how much energy is in two types of Crisps.

Or use tongs





Which type of crisp contains the most energy in KJ?

### Research (Gwaith Cartref)

How much energy (KJ) is found in 1 gram of the following nutrients?

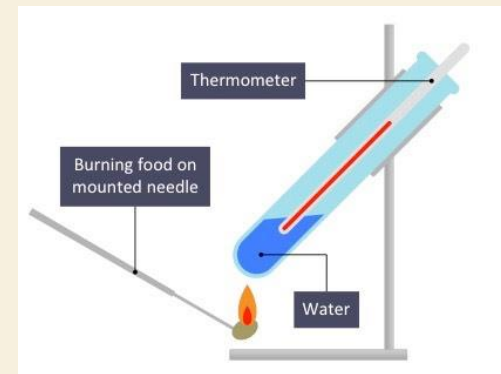
Carbohydrate

Protein

Fat

# Success Criteria

Fill in a success criteria, what will we need to do for a successful fair investigation.



**Success Criteria. To be successful I will.....**

**Achieved  
Yes/No**

Test two types of crisp and then compare their energy.

# Apparatus

- Clamp stand, clamp and boss
- Heat proof mat
- Bunsen burner
- 1 boiling tube
- Tongs
- Access to a balance
- Thermometer
- Measuring cylinder
- Goggles and hair tie (if needed)
- 2 different types of crisp

# Method

This method is not in the correct order.

Put the letters in the correct order for this method.

- A. Using a measuring cylinder measure  $20 \text{ cm}^3$  of water and then place it into your boiling tube.
- B. Calculate the temperature change.
- C. Measure the mass of your crisp in grams.
- D. Hold the burning food underneath the boiling tube of water.
- E. Once the food has fully burnt, place it on the mat and measure the temperature of the water.
- F. Set up your apparatus.
- G. Repeat this for the two crisps and carry out repeat readings.
- H. Use the thermometer to measure the temperature of your water.
- I. Hold the food with the tongs and set it alight using the Bunsen burner.

# Answers

F (A,C,)H I,D,E,B,G

A,C can be swapped.

# Results

Design a suitable result table.

Look at method on the work sheet, this will help you decide on the number of columns needed in your table.



# Plenary

Time:

Noise Level

True



False



For each question answer by using your thumbs.

# Plenary

Time:

Noise Level

True



False



1) The independent variable is the type of crisp?

# Plenary

True



Time:

Noise Level

1) The independent variable is the type of crisp?

# Plenary

Time:

Noise Level

True



False



2) Use a beaker to measure the 20 cm<sup>3</sup> of water.

# Plenary

Time:

Noise Level

False



2) Use a beaker to measure the  $20 \text{ cm}^3$  of water.  
How can I correct this?

Use a measuring cylinder

# Plenary

Time:

Noise Level

True



False



3) The dependent variable is the mass of the crisp.



# Plenary

Time:

Noise Level

False



3) The dependent variable is the mass of the crisp.

Temperature change of the  
water.

# Plenary

Time:

Noise Level

True



False



4) I will control the following variables, volume of water, equipment used and the distance between the burning food and the boiling tube.

# Plenary

True



Time:

Noise Level

4) I will control the following variables, volume of water, equipment used and the distance between the burning food and the boiling tube.

# Plenary

Time:

Noise Level

True



False



5) During investigation I carry out repeat reading so I can find out if my results are reliable.

# Plenary

True



Time:

Noise Level

5) During investigation I carry out repeat reading so I can find out if my results are reliable.